

In the Claims

1-14. (Cancelled)

15. (Currently amended) A superconducting current limiting device for current limiting a circuit, comprising:

an interconnected high magnetic permeability structure including a central core coupled to at least a first arm and a second arm branching off ~~therefrom~~ there from;

a high temperature superconductor superconductive coil surrounding the central core for biasing the central core into magnetic saturation during normal operation;

a first alternating current coil surrounding the first arm and coupled to an alternating current source; and

a second alternating current coil surrounding the second arm and coupled to an alternating current load,

wherein the first and second alternating current coils are magnetically coupled to the central core, the device limiting the current passing through the device upon an occurrence of a fault condition in the load by taking the central core out of the magnetic saturation during the fault condition, thereby providing an impedance between the current source and the current load.

16. (Previously presented) The device according to claim 15, wherein each of the first and second arms substantially form a loop which couples a first end and a second end of the central core.

17. (Previously presented) The device according to claim 16, wherein each of the loops includes a first portion and a second portion, the first and second portions being separated by an air gap.

18. (Previously presented) The device according to claim 15, wherein the structure is composed of a ferrous material.

19. (Previously presented) The device according to claim 15, wherein a first cross-sectional width of a first high magnetic permeability material forming the core is substantially twice a second cross-sectional width of a second high magnetic permeability material forming the arms.

20. (Previously presented) The device according to claim 15, wherein the superconductive coil is adjacent to the central core.

21. (Previously presented) The device according to claim 16, wherein the central core area is substantially between one and two times an outer limb area.

22. (Previously presented) The device according to claim 16, wherein the central core area is determined substantially in accordance with the following relationships:

$$2\Phi_1 = \Phi_2 + \Phi_3$$

and

$$B_1A_1 = B_2A_2 + B_3A_3$$

wherein B is a magnetic flux density in each limb in tesla, A is a cross sectional area of each limb in meters squared, and Φ is a magnetic flux in each limb in Webber, and wherein a subscript 1 represents the core and subscripts 2 and 3 represent the arms.

23. (Currently amended) A multiphase superconducting current limiter device for current limiting a circuit, comprising:

a central core composed of a high magnetic permeability material;

a high temperature superconductor superconductive coil surrounding the central core for biasing the central core into magnetic saturation during normal operation;

a first plurality of alternating current phase coils, each of the first plurality of coils being coupled to a phase of an alternating current source; and

a second plurality of alternating current coils coupled to a phase of at least one alternating current load,

wherein the first and second plurality of coils are magnetically coupled to the central core, the device limiting a current passing through the device upon an occurrence of a fault condition in one of the source and the load by taking the central core out of the magnetic saturation during the fault condition, thereby providing an impedance between the current source and the current load.

24. (Currently amended) A multistage superconducting fault current limiter device, comprising:

a first superconducting fault current limiter limiting a current during a first portion of a transient fault; and

a second superconducting fault current limiter limiting the current during a second portion of the transient fault,

wherein each of the first and second superconducting fault current limiters includes:

an interconnected high magnetic permeability structure including a central core coupled to at least a first arm and a second arm branching off there from;

a high temperature superconductor superconductive coil surrounding the central core for biasing the central core into magnetic saturation during normal operation;

a first alternating current coil surrounding the first arm and coupled to an alternating current source; and

a second alternating current coil surrounding the second arm and coupled to an alternating current load.

wherein the first and second alternating current coils are magnetically coupled to the central core, the device limiting the current passing through the device upon an occurrence of a fault condition in the load by taking the central core out of the magnetic saturation during the fault condition, thereby providing an impedance between the current source and the current load.

25. (Previously presented) The device according to claim 24, wherein the first portion includes an initial portion of the transient fault and the second portion includes a steady state

portion of the transient fault.

26. (Currently amended) A multiphase superconducting current limiter device, comprising:

a single [[one]] cryostat;

a single [[one]] cryocooler; and

an interconnected high magnetic permeability structure including a central core coupled to at least a first arm and a second arm branching off there from;

a single [[one]] superconducting coil surrounding the central core for biasing the central core into magnetic saturation during normal operation;

a first alternating current coil surrounding the first arm and coupled to an alternating current source; and

a second alternating current coil surrounding the second arm and coupled to an alternating current load,

wherein the first and second alternating current coils are magnetically coupled to the central core, the device limiting the current passing through the device upon an occurrence of a fault condition in the load by taking the central core out of the magnetic saturation during the fault condition, thereby providing an impedance between the current source and the current load.

27. (Currently amended) A DC saturated superconducting current limiter device, comprising:

an interconnected high magnetic permeability structure including an iron core including at least one air gap, the central core coupled to at least a first arm and a second arm branching off there from;

a high temperature superconductor superconductive coil surrounding the central core for biasing the central core into magnetic saturation during normal operation;

a first alternating current coil surrounding the first arm and coupled to an alternating current source; and

a second alternating current coil surrounding the second arm and coupled to an alternating current load,

wherein the first and second alternating current coils are magnetically coupled to the

central core, the device limiting the current passing through the device upon an occurrence of a fault condition in the load by taking the central core out of the magnetic saturation during the fault condition, thereby providing an impedance between the current source and the current load.

28. (Currently amended) A series of multi-phase DC saturated superconducting current limiter devices, comprising:

a plurality of iron cores,

wherein at least one of the plurality of iron cores includes at least one air gap, [[and]]

wherein at least one of plurality of iron cores includes [[has]] a continuous iron core, and wherein each of the devices further includes:

a high temperature superconductor superconductive coil surrounding the respective iron core for biasing the iron core into magnetic saturation during normal operation;

a first alternating current coil surrounding a first arm coupled to the respective iron core and coupled to an alternating current source; and

a second alternating current coil surrounding a second arm coupled to the respective iron core and coupled to an alternating current load,

wherein the first and second alternating current coils are magnetically coupled to the respective iron core, the device limiting the current passing through the device upon an occurrence of a fault condition in the load by taking the respective iron core out of the magnetic saturation during the fault condition, thereby providing an impedance between the current source and the current load..